Before the
Federal Communications Commission
Washington, D.C. 20554

Amendment of Parts 2 and 25 of the Commission's Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the Ku-Band Frequency Range;	)	ET Docket No. 98-206 RM-9147 RM-9245
Amendment of the Commission's Rules to Authorize Subsidiary Terrestrial Use of the 12.2-12.7 GHz Band by Direct Broadcast Satellite Licensees and Their Affiliates; and	)	
Applications of Broadwave USA, PDC Broadband Corporation, and Satellite Receivers, Ltd. to Provide A Fixed Service in the 12.2-12.7 GHz Band	)	

MDS AMERICA, INCORPORATED
PETITION FOR RECONSIDERATION

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EXECUTIVE SUMMARY

MDS America, Incorporated ("MDS America") submits this Petition for Reconsideration ("Petition") of the Commission's MVDDS Order establishing technical rules for the new MVDDS service. MDS America strongly supports the Commission's decision to adopt rules permitting the prompt licensing of MVDDS operators through competitive bidding procedures. MDS America does, however, urge the Commission to reconsider the specific technical rules discussed below. MDS America is greatly concerned that, if these technical rules remain in their current form, MVDDS service will not be deployed in rural areas, the unserved and underserved areas most needful of additional broadband Internet, video distribution, and data services.

In particular, MDS America urges the Commission to adopt, as it had previously proposed, a two-tiered EIRP limitation, allowing greater MVDDS transmitter power in rural areas. Specifically, MDS America proposes that the Commission retain its urban EIRP limit of 14 dBm, but that it increase the rural EIRP limit to 39 dBm. No harmful interference will result to DBS systems as a result of this increase. In addition, as shown by an MVDDS analysis of the economics of provision of MVDDS service to a rural location, this power increase will permit MVDDS service areas of sufficient size for their economic viability, allowing service to be deployed in rural areas. Moreover, as shown by MDS America's analysis of the relevant RF engineering design constraints on MVDDS systems and the RF relationship between MVDDS systems and DBS systems, the higher power limit will allow MVDDS providers to design systems that can provide additional protection to DBS operations. The higher rural power limit will allow MVDDS operators to avoid, by locating higher-powered transmitters outside an urban area, multipath problems that could arise from the use of lower-powered transmitters located within the urban area.

MDS America also urges the Commission to implement a two-tiered approach also to its EPFD limits to accommodate MVDDS deployment in rural areas. MDS America therefore resubmits its four-region, urban/rural EPFD limit proposal and urges its adoption on reconsideration.

With respect to NGSO sharing, MDS America urges the Commission to repeal as prematurely adopted (based on the limited information available as to NGSO system characteristics and deployment) its rule establishing a maximum PFD limit. In the alternative, MDS America urges the Commission to modify the limit for rural areas to -109 dBW/m2/4kHz at distances greater than 3 km at the surface of the earth.

Additionally, MDS America requests that the Commission clarify the bandwidth restriction of its emission mask rule. In its present form, the rule appears to require a channelization plan despite the Commission's apparent view that there should be no such restrictions on an MVDDS operator's use of the 500 MHz bandwidth allocation.

Finally, MDS America requests that the Commission eliminate certain aspects of its DBS frequency coordination procedures. In particular, in order to avoid unduly burdensome procedures, and prevent the unnecessary sharing of commercially sensitive information between DBS and MVDDS operators, the Commission should not require MVDDS operators to survey the area near a proposed transmitter site to determine where DBS receivers have been installed. Rather, the Commission should require a DBS operator, within 45 days of receipt of a notice of planned MVDDS transmitter installation, to identify those locations with customers of record as to which it has interference concerns. The parties would then cooperate to resolve those concerns as now provided in the Commission's Rules.

MDS America submits that, with the requested modifications, the Commission will be able to achieve its public interest goals of promoting deployment of new MVDDS service, particularly in rural areas, while adequately protecting DBS and NGSO satellite service reception.

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MDS AMERICA, INCORPORATED
PETITION FOR RECONSIDERATION

I. Introduction

MDS America, Incorporated ("MDS America") applauds the Commission's decision in the above-referenced proceeding[1] to permit Multichannel Video Distribution and Data Service ("MVDDS") to share the 12.2-12.7 GHz band with Direct Broadcast Satellite ("DBS") service. As the only company with an MVDDS technology deployed in active, operating systems around the world, MDS America also strongly supports the Commission's decision to establish a level playing field for parties interested in obtaining MVDDS licenses.

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[1] Amendment of Parts 2 and 25 of the Commission's Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the Ku-Band Frequency Range; Amendment of the Commission's Rules to Authorize Subsidiary Terrestrial Use of the 12.2-12.7 GHz Band by Direct Broadcast Satellite Licensees and Their Affiliates; and Applications of Broadwave USA, PDC Broadband Corporation, and Satellite Receivers, Ltd. to Provide a Fixed Service in the 12.2-12.7 GHz Band, *Memorandum Opinion And Order and Second Report and Order*, FCC 02-116 (released May 23, 2002) (hereafter, "MVDDS Order").

While the Commission's decision was significant, MDS America respectfully submits that one critical step must be taken in order for MVDDS to realize its true potential, as a service for unserved and underserved rural areas. Unless the Commission permits MVDDS transmitters to operate at a higher power level in rural areas, MVDDS will never become a viable service for those who need it most—rural Americans. Significantly, taking this step will not cause MVDDS to harmfully interfere with DBS but in fact will allow MVDDS systems to be designed that provide greater protection to DBS receivers. MDS America therefore submits this Petition for Reconsideration ("Petition") outlining the steps that the Commission must take in order to bring choice in video programming and high-speed broadband services to rural Americans.

II. Overview: The Commission Should Adopt Higher MVDDS Power Limits to Permit MVDDS Deployment in Rural and Areas and to Increase Protection of DBS in Urban Areas.

The deployment of broadband services, particularly to rural America, has become a national priority. President Bush, Chairman Powell and the other Commissioners, Department of Commerce Secretary Evans, Senators Hollings and Lieberman, and Congressman Tauzin, among many others, have all embraced the mantra of rapid deployment of broadband services to rural areas. Members of Congress are continually introducing bills proposing various tax credits, government loans, or other funds to create incentives for the provision of broadband services in rural areas. Each of these proposals has a similar theme: broadband services are not generally available in rural areas, because facility installation costs cannot be recovered due to low population density, and therefore they must be promoted by the federal government.

It is beyond debate that the *technology* to establish rural broadband systems exists today. American companies have long had the *technology* to achieve very high-speed data transmission

rates to every home and business in the US. However, although the technology exists to connect rural (and frankly, suburban and smaller urban area) homes to that soon-to-be-ubiquitous data network, the Internet, the business conditions to allow these same companies to pay for such broadband technology are not there. In short, while we *technically* can connect every American home to the Internet at broadband rates, we cannot pay for these connections. So the US government offers to assist in paying for broadband deployment.

In its MVDDS Order, the Commission recognized, to some extent, the potential that MVDDS represents for rural America. For example, the Commission stated:

> With current growth rates, it appears possible that smaller markets and rural areas may not be provided with "local-into-local" [video] service from DBS for the foreseeable future. The combination of these factors lead us to believe that a terrestrial service, such as MVDDS, could include transmitters sited in rural areas and thus can fill this void.[2]

Further, in advocating component economic areas ("CEAs") as the appropriate geographic service area for MVDDS licenses, the Commission stated, "[w]e believe that CEAs will encourage rapid service deployment to less populated and rural regions of the nation because . . . these service areas will permit additional opportunities for small businesses to provide MVDDS and thus, more varied groups of service providers."[3]

The Commission also made very clear that it expects MVDDS to compete with existing services, such as DBS and cable. For example, the Commission refused to establish defined channels within the 500 MHz allocated to MVDDS licensees, stating,

> We do not believe the sub-division proposals are the best approaches for this particular service. Due to the complex sharing arrangement in the 12 GHz band between MVDDS, DBS and NGSO FSS, we believe that operations in this band may be more susceptible to interference from adjacent systems. *We also do not believe that 125 megahertz spectrum blocks will place an MVDDS licensee in a*

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2 MVDDS Order at ¶ 23 (footnotes omitted).

3 MVDDS Order at ¶ 132 (footnotes omitted).

> *position to compete with other MVPD providers.* Rather, 125 MHz spectrum blocks will place MVDDS licensees *in the second tier of MVPD providers at the outset*. A single licensee operating on a 500 megahertz block of spectrum in each service area would reduce the number of transmitting antennas, and thus the aggregate power per area. This approach would mitigate the potential number of interference sources to DBS and NGSO FSS users and would also alleviate concerns regarding responsibility for interference.[4]

Unfortunately, given the severe constraints on the rural MVDDS transmitter power limit in the Commission's technical rules, *no one* will be able to deploy an MVDDS system in a highly rural area, purely as a matter of economics. Thus, ironically, while the Commission sought to avoid establishing MVDDS as a "second tier" service, unable to compete with DBS and coaxial cable, the Commission *has done just that* by restricting rural EIRP limits. MDS America emphasizes here that its technology easily conforms to the MVDDS technical rules the Commission has adopted. MDS America's concerns are therefore not for itself, but for the service.

In *ex parte* submissions to this docket, MDS America proposed that the Commission establish higher transmission power limits for rural areas in comparison to urban areas. Higher power levels are necessary in rural areas in order to achieve sufficient coverage; larger coverage areas are necessary in more rural areas due to population densities. Significantly, higher power levels *will not* cause MVDDS providers to harmfully interfere with DBS systems. Indeed, the lower power level established by the Commission for rural areas could increase the potential for harmful interference to DBS in urban areas—for counterintuitive reasons—because keeping the power limits the same in rural areas as in urban areas greatly limits urban MVDDS system design options.

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[4] MVDDS Order at ¶ 135 (footnotes omitted) (emphasis added).

MDS America knows that raising the transmitter power limits will not cause harmful interference to DBS for a simple reason: MDS America's technology licensor, MDS International, uses higher power levels, even in an *urban* area such as Lyons, France, without any complaints, whatsoever, from DBS customers—and it has been doing so for *eight years*, since 1994. *Real-world* experience—easily verifiable (as already done by LCC International) as well as easily duplicated here in the U.S.—demonstrates this is so, not a computer model based on a failed "northpointing" concept.

The Commission still has the opportunity to strike the appropriate balance that achieves fulfillment of the key public interest goal of this docket: encouraging provision of high-speed Internet access and choice in multi-channel video to the Americans who need it most, while protecting DBS from harmful interference. Given the high priority that our country places on advanced broadband services and competition in video programming, the American public deserves nothing less.

III. The Commission Should Establish Higher MVDDS Transmitter Limits for Rural Areas.

A. Higher Rural EIRP Limits Are Appropriate for MVDDS.

Although its proposed rules would have established a separate, higher MVDDS transmitter equivalent isotropic radiated power ("EIRP") limit for rural areas, the MVDDS rules adopted by the Commission have only one EIRP limit of 14 dBm for both urban and rural areas. As discussed in greater detail below, this decision has the practical effect of precluding the provision of MVDDS in rural areas, depriving the Americans living in those areas from rapid deployment of high-speed broadband services or an alternative video programming service. Moreover, it also reduces the level of protection to DBS that can be achieved in urban areas,

because EIRP is one of the mitigation tools that an MVDDS designer has at his or her disposal to protect DBS operations.

MDS America therefore urges the Commission to retain the previously proposed two-level approach, but MDS America does not believe that the rural MVDDS EIRP needs to be as high as originally proposed. MDS America recommends that the Commission raise the EIRP limit in rural areas to 39 dBm. At this level, MDS America knows, from real-world experience, that MVDDS operators can continue to protect DBS systems from harmful interference. However, this reasonable, higher, rural EIRP level will at the same time allow MVDDS providers to cover larger areas, ensuring that rural Americans will receive the full benefits of MVDDS. A higher rural EIRP level will also give MVDDS operators more flexibility in designing their systems to prevent harmful interference to DBS customers in urban areas, as explained more fully below.

Nor need the Commission be concerned about rural areas eventually becoming urban areas, yet still being subject to the higher EIRP limit for rural areas. The concern for harmful interference to DBS, and the difficulties in engineering around it, do not arise because of high population density *per se*. Instead, they arise when an urban area has several tall buildings, each at least eight to ten stories high, clustered together. In that situation, the multipath phenomenon requires special engineering of MVDDS systems, and a higher EIRP limit could potentially cause harmful interference to DBS customers.

A rural area will "suddenly" become urban, from the perspective of MVDDS/DBS coexistence, only under extremely rare circumstances, where buildings more than eight to ten stories tall are built close together within a short time frame. In any event, MVDDS operators are

mandated to avoid harmful interference to DBS customers under various other rules established by the Commission.

B. Engineering Basics of MVDDS System Design in Urban vs. Rural Areas Demonstrate the Importance of a Higher Rural EIRP Limit for MVDDS.

Significantly, while MITRE Corporation's computer models called into question *Northpoint's* system design, they demonstrated that MVDDS and DBS systems operating in the 12 GHz band can co-exist, just as two DBS systems can co-exist, because in some respects the inter-system relationships are similar. To a certain degree, constructing an MVDDS system is similar to starting a new DBS system in the same service area, from an RF engineering perspective. The key to solving the MVDDS/DBS sharing problem is therefore the means of addressing the ways in which the MVDDS/DBS environment *differs* from the purely satellite environment.

Essentially, there are two basic differences between MVDDS, operating on the ground, and DBS, operating from the sky:

1. Stability of Power levels
    a. Stable DBS Power Levels: A satellite's transmission power levels are essentially the same everywhere within the satellite's footprint.

    b. Variable MVDDS Power Levels: MVDDS power levels vary greatly within the MVDDS footprint.

2. Predictability of Transmission Vectors
    a. Fixed DBS Transmission Vectors: Satellite transmission vectors, particularly the elevation angles, are very predictable.

    b. Unpredictable MVDDS Transmission Vectors: MVDDS transmission vectors, particularly the elevation and azimuthal angles, are very unpredictable, relative to a DBS system.

Further, DBS service coverage areas are extremely large, and because power and elevation are fixed for DBS operators, they do not represent a significant limitation on DBS service area size.

In contrast, these parameters essentially define a particular MVDDS transmitter's coverage area. In other words, MVDDS systems necessarily require engineering finesse to ensure that they do not harmfully interfere with DBS systems while still providing service to a reasonably large geographic area.

In fact, control of EIRP and vector control are the main tools that an MVDDS systems designer can use to balance coverage area *and* prevent harmful interference to DBS. These two tools can also be mutually exclusive options; for example, as the EIRP level increases, so does the potential coverage area and the potential for harmful interference, demanding greater control of the transmission vectors. If the opportunity for control of the transmission vectors decreases, the need for greater and more specific EIRP control increases.

These tools are needed at different times to solve different problems. In rural areas (that is, areas without tall buildings), problems from multipath reflections are much less frequent than in urban areas, but the need to reach larger geographic areas is much greater. In rural areas, because of the rarity of multipath problems, the transmission vectors are more controlled, allowing the system designer (if permitted by the Commission) to take advantage of higher EIRP levels to serve a larger geographic area. Urban areas present the opposite problem. Because transmission vectors are much less controllable than in rural areas (because of tall buildings), the MVDDS systems designer has to focus on the controllable tool, EIRP level, to protect DBS systems.

The fundamental differences between MVDDS system deployment in rural and urban areas apply both to system usage and to the basic system design. Each setting presents a unique set of problems for achieving an MVDDS operator's core goals: ensuring economical viability of the MVDDS system while preventing harmful interference to incumbent satellite systems.

MDS America therefore continues to urge the Commission to establish different EIRP levels for rural areas in comparison to urban areas. Two EIRP levels allow for realistic deployment of MVDDS in rural areas while ensuring that DBS customers do not receive harmful interference. Without these different standards, there will be two effects on future MVDDS systems:

1. There will be no rural deployment of MVDDS.
2. The urban systems that are attempted will be much more likely to interfere with existing DBS systems than if there were two standards with much higher EIRP levels for rural systems.

C. Even Assuming an Extremely Low-Cost System, a Low Rural EIRP Limit Means No Rural Deployment of MVDDS.

The EIRP levels specified by the Commission's MVDDS Order effectively prohibit the buildout of rural systems. This can be demonstrated by coverage area predictions, at the Commission's selected output power, for an MDS America licensed system. The Commission's EIRP limit would limit the MVDDS transmitter coverage area of an MVDDS system to about 120 square miles, far smaller than the 2,000 to 10,000 square mile typical coverage area of an MDS International system. Regardless of the arguments posited by Northpoint in this docket, it is easily shown *that MVDDS systems that cover such a small area cannot exist in most rural environments*.

Let us consider the business aspect of an MVDDS system. In order for an MVDDS system to be viable, each cell of the system must pay for itself within a reasonable time. This is regardless of the data transmitted, Internet traffic, multi-channel video programming, or data. Because the transmission and reception of Internet is cheaper and easier than data, for the sake of this argument we will consider an Internet transmission system. Let us build a rural system.

The MDS transmission system is very inexpensive. But for the sake of this argument let us take it as free, with no cost to the future MVDDS operator. However, in order to provide Internet access, there are other equipment requirements: reception equipment for connecting the transmission site to the Internet backbone; at least one good-sized and capable router; network administration equipment; equipment for converting the wired TCP/IP communications from the backbone to a signal capable of RF transmission; and ancillary equipment within the site to allow configuration of the system. We also need some small space to store this equipment. In addition, we need tower space for the transmission equipment. We will also need to feed the system with bandwidth in a rural area and pay a supplier for this bandwidth.

We need to make some business assumptions to model this system. Let us assume we will amortize this equipment over three years (totally ignoring interest and financing). Let us assume that there are only two people per house in the area we will be serving. Let us also assume that all of these houses (100%) have a broadband-capable computer at home. Let us further assume that the area where we want to provide this service is flat, without RF shadows that might obstruct our transmissions. In addition, we will assume that all houses have ample finances to pay, up-front, for reception equipment. In short, this area is optimal for such a system. Let us also assume that 10% of the entire target population will take our service in the first month and keep it for one year. We will ask $50 a month for our new service to make it competitive.

Because this is just an example, as mentioned before, we have left out much of the MVDDS system equipment, which would also have to be paid for under normal circumstances. This example also excludes having on-site systems support personnel, customer support, billing, electrical bills, 401k plans for employees, and advertising, all of which normally serve to

increase the cost to the MVDDS operator. After excluding these usual costs, we will now put some numbers to the costs we do have:

Example System

Equipment for High-Capacity Backbone Internet Connection (includes reception, router, etc.)	$50,000.00
Equipment for Conditional Access and Network Management (to include HW/SW for RF encapsulation)	$100,000.00
Equipment for Customer Administration and Service Support (installation, customer validation, servers)	$75,000.00
Ancillary Equipment (UPS, racks, telephones, redundancy, etc)	$25,000.00

These costs total $250,000 U.S., without customer premises reception equipment. Amortizing the above we get:

Costs	**Total**	**Monthly**
Equipment Amortization	250,000/36 months	$7000.00
Tower Space and Building rent	$2000.00 monthly	$2000.00
Bandwidth Costs	$500.00 monthly	$500.00

		$9500.00

This simple analysis, based on costs which are admittedly reduced and simplified, indicates that the estimated monthly cost for providing MVDDS service would be $9,500. That means the provider would need 190 customers to pay just for minimal equipment, rent, and bandwidth. Because this model service provider would "only" be getting 10% of the target population (a generous estimate), the provider would need a target population of 1900 people in its coverage area. However, remember that the provider is getting customer homes, not

individual people. Let's assume there are two people to a home (although in reality, the average is likely to be greater than two). This then ups the minimum target population to 3800 people. Now we bring in our coverage area of 120 square miles. This means that our conservative system, if the equipment were free and we did not have employees, insurance, financing costs, etc., would require a *minimum* population density of 38 people per square mile to pay for the equipment under highly optimal conditions. Compare this to the population density of Montana, at 6 people per square mile, or Wyoming, with a population density of 5 people per square mile.

It is important to remember here that, in this example, we have not paid for personnel to run this system, and we have not addressed the ancillary business costs associated with running any U.S. business. These added costs would mean that an even higher population density would be needed to support an MVDDS system with a 120 square-mile coverage area. It is abundantly clear that given the EIRP levels specified by the Commission in the MVDDS Order, ***rural MVDDS systems will never be deployed.***

D. Lower EIRP Limits in Rural Areas Will Increase Interference to Incumbent DBS Systems in *Urban* Areas, Because MVDDS Operators Will Lack a Key Tool—Higher Transmission Power—to Prevent Harmful Interference to DBS.

Unfortunately, much of the data submitted in this proceeding stems not from actual experience with MVDDS systems but rather from theoretical systems that have never existed in real-world configurations. Computer engineers like to categorize methods as either *elegant*, if the system uses engineering finesse to achieve its results, or, if the system achieves its effect through happenstance or obviousness, as *brute force*. Keeping the EIRP limit for rural areas very low, or otherwise reducing the system coverage size (as Northpoint has said it would do—with MVDDS coverage areas limited to only 100 square miles), is an example of the *brute force* approach. (Using "off-the-shelf equipment," rather than equipment specifically designed to provide

MVDDS, only compounds the situation.) A shoe can be used to pound a nail, but a hammer is always better, and the ideal hammer is best. Such a system necessarily limits the amount of finesse available to prevent harmful interference to incumbent systems.

However, brute force almost always costs more than it is worth, and often does achieve the ultimate goal, because it reflects an incomplete understanding of the problems involved. The problems associated with a "brute force" MVDDS system are not so hard to understand. As discussed previously, EIRP levels and transmission vectors are powerful tools in the hand of the RF system designer making MVDDS systems. However, because the MVDDS Order basically takes the EIRP level option away from the MVDDS system designer, only the transmission vector is available as a tool for preventing harmful interference to DBS.

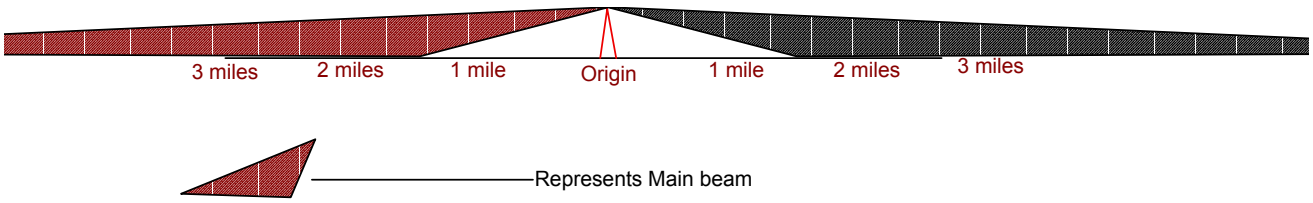
Building MVDDS systems in urban areas while satisfying the Commission's EIRP limits is extremely difficult because of the potential for multipath problems. These problems will manifest themselves in two forms. The first will be the MVDDS operator's difficulty in distributing signal. The second problem will be the MVDDS system's transmissions directly into the look angle of the satellite reception equipment.

In the MVDDS Order, the Commission states that "we are not permitting higher powers over areas containing mountain ridges or over presently unpopulated regions because the higher EIRP may cause too great of an exclusion zone for future DBS and NGSO FSS subscribers . . . ." Here, it appears that the Commission is concerned about a preclusive impact on DBS and NGSO growth, although the Commission has stated, as appropriate for co-primary services, that its real concern is the protection of *incumbent* operations. The Commission has adopted a number of rules designed to achieve this objective. Moreover, a number of techniques exist with respect to

deployment of new satellite receiver equipment that can ensure co-existence with prior-deployed MVDDS systems.

The low rural EIPR limit also reflects, to MDS America, an incomplete understanding of an "exclusion zone." An exclusion zone is *not* that area in which there can be no DBS customers; rather, it is the area around a transmission tower that receives very little radiated RF output from the transmission tower. Exclusion zones, therefore, are not areas of higher interference, but rather areas of NO interference to DBS customers, because they are the areas with the weakest MVDDS signal. The MVDDS system designer's goals are to design the system to limit interference to DBS customers to permitted levels while nonetheless finding ways to serve MVDDS customers with a controlled signal originating outside the exclusion zone that does not interfere with DBS reception.

Consider how these systems should be built. Using an MDS America approach, the MVDDS main beam is so shaped to restrict the RF energy reaching the consumers directly under



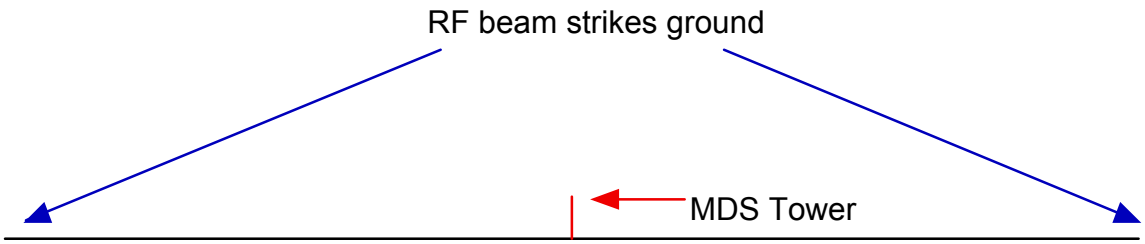
(Figure 1)

the transmission tower and within a reasonable radius from the transmission site. (*See* Figure 1). The height of the tower here is vastly exaggerated. Using the scale of figure 1, the transmission antenna at 300 meters above the ground would barely even be significant.

However, this configuration allows the MVDDS systems designer to use higher EIRP levels to cover large areas due to the angular separation of *any* DBS receiver within the MVDDS coverage area. In other words, any DBS antenna in this configuration would receive signal from

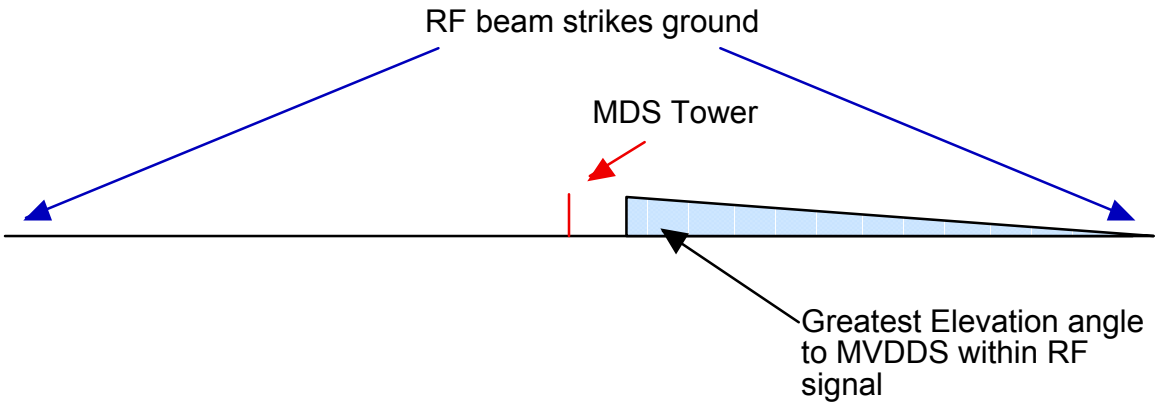
a satellite from a vector with an angular separation from the MVDDS transmission vector greater than 9°, the separation required to isolate one satellite system from another. In fact, if the RF beam strikes the ground 3 kilometers from the transmission tower, the tower would have to be more than 750 meters tall to have a transmission vector 10° above the horizon for anyone in the RF beam *at its closest available point* or, better said, *in the very worst case.*

To give a graphic illustration of this on a real scale, below is a diagram showing the height of a tower such as MDS America used in Clewiston, Florida, in relation to where the beam would strike the ground (each inch represents one kilometer) (*see* Figure 2):



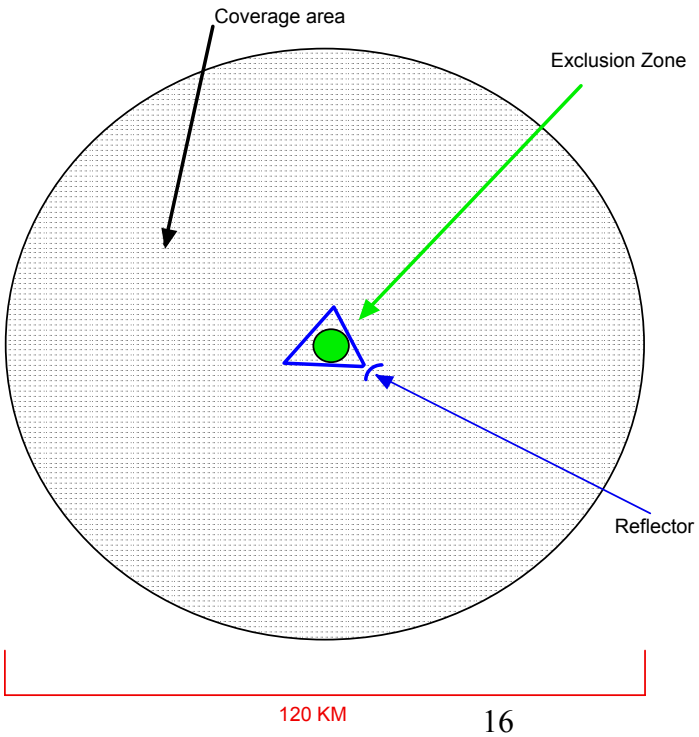
(Figure 2)

This illustration is not the best case for MVDDS. It is the worst case. All other DBS receivers within the MVDDS beams will have a greater angular elevation separation than those demarcated by the touchdown point of the RF beam.



(Figure 3)

It becomes very easy to see that the *maximum* elevation vector of the MVDDS beam is significantly lower than the *minimum* elevation vector of any real-life DBS system. When we look at the distribution map of such a system from above, we see that we can maintain these angular relationships and keep only a very small portion of the total area not covered by the MVDDS system provided that the MVDDS EIRP levels are sufficient. The exclusion zone will grow with the height of the tower but likewise so will the coverage. Using a reasonable scale to map the reach of the MDS America experimental system in Clewiston, Florida (*see* Figure 4), we

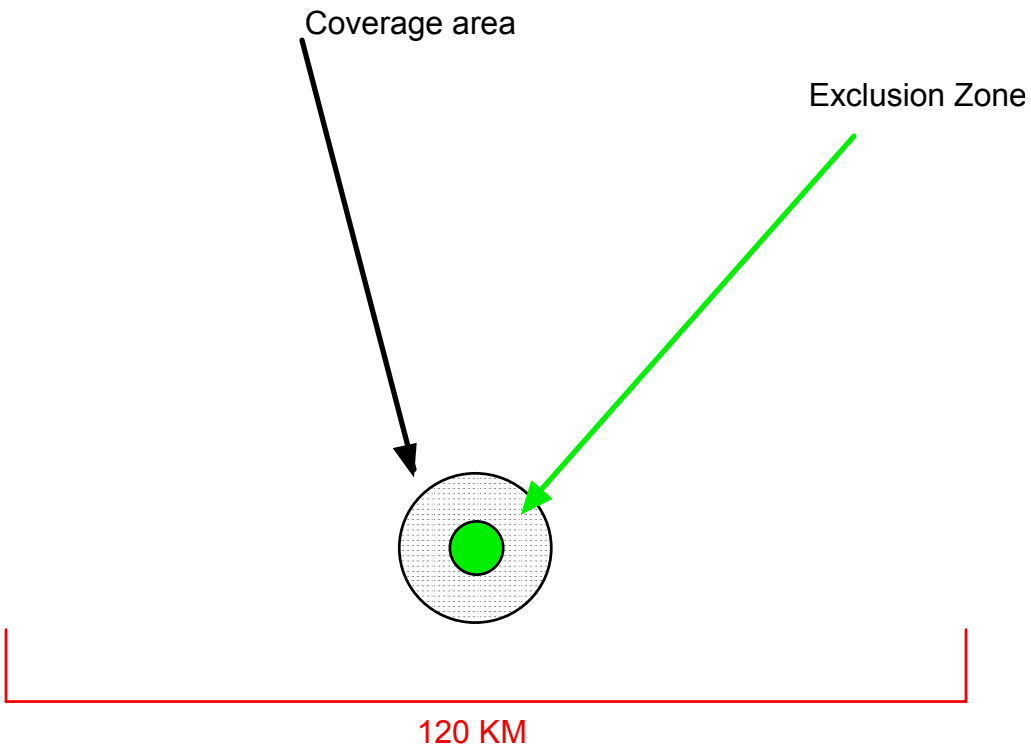


(Figure 4)

find that the coverage zone would comprise about 12,000 square km, with the exclusion zone area of no coverage being less than 30 square km.

In fact, because our main concern here is angular separation, the MVDDS operator, given a robust, mature system, can erect a small reflector in the coverage area that will reflect a portion of the RF beam at a very small elevation angle back across the exclusion area, giving 100% coverage to potential MVDDS subscribers. This is done, of course, without any harmful interference to DBS customers within the "exclusion zone" because they are not subject to emissions from the in-zone transmitter.

This type of system is implemented in MDS International systems actively operating in other areas of the world in the shadow of existing DBS systems—*without* causing harmful interference to those DBS systems. This type of system is *not,* however, possible using the rural EIRP limit specified in the MVDDS Order. By substituting the EIRP limit suggested by the Commission's Order, we can see the model here change. Given a reasonable EIRP in a rural area (but higher than the MVDDS Order specifies), the exclusion zone becomes not a function of the EIRP but of the angular relationship of existing and future DBS subscribers and the transmitters of the MVDDS system. This means that reducing the power output of the MVDDS transmitter will *not* reduce the size of the exclusion zone but *will* significantly reduce the coverage profile of any MVDDS system. Using the same scale to illustrate the area as used above we find a coverage map that looks more like the one illustrated below:

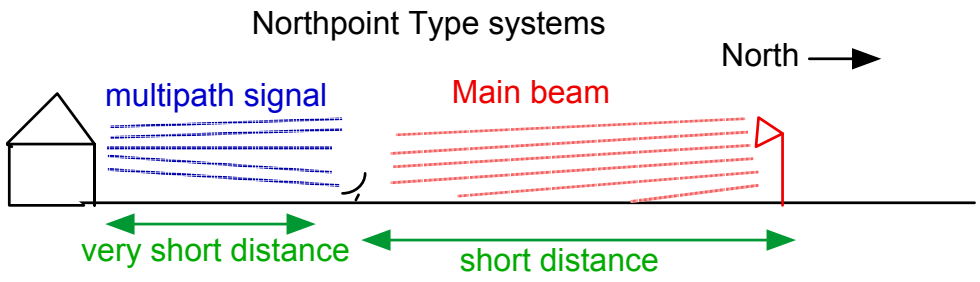


(Figure 5)

Solving for areas here, and keeping in mind MDS America's point that rural systems cannot be established at this EIRP, we now find that in order to *properly* maintain angular separation from DBS, the exclusion zone now represents more than 10% of our total coverage area. Because the EIRP at the fringe of the coverage area is not sufficient to reflect signal back into the exclusion zone, this exclusion zone area needs to be removed as an area of coverage.

Because these underpowered systems will only be built in urban areas to begin with (due to costs, as discussed above), and because the Commission does not require these exclusion zones, it is questionable whether any MVDDS designer would voluntarily cut out 10% of the target population in an urban area. No DBS-protective exclusion zones will therefore be designed. This means that there will be MVDDS systems that are beaming signal directly into the boresight of DBS reception antennas.

Of course, there is the system proposed by Northpoint. As proposed, with Northpoint's system, the MVDDS designer does not reduce the coverage area by 10% but rather by 20%, and while it does not beam signal into DBS antenna boresights directly, the system is a recipe for severe multipath problems. Such a system will not only interfere with DBS customers, it will also cause interference problems to MVDDS customers as well. Horizontal differentiation as envisioned by Northpoint does not work and never has. It represents a lack of understanding of MVDDS systems in particular and RF systems in general.



Thus, the Commission's limitation of *rural* EIRP limits has the practical effect of precluding systems relying on vertical differentiation as a mitigation technique, ensuring that only Northpoint-type urban systems will built, because they would be the only MVDDS systems with any hope of economic viability. If Northpoint-style systems proliferate, MVDDS will indeed cause some interference problems for DBS users—as MITRE correctly recognized—and *without bringing broadband access to rural consumers*. Thus, ironically, lower *rural* EIRP limits as specified by the Commission would result in interference to DBS customers, without providing for rural broadband.

However, in the MVDDS Order, the Commission specifically stated that

> we agree with [MDS America] that we should shift our focus from proposals that transmit antennas "generally point southward" and that receive antennas have a

> "minimum unidirectional gain of 34 dBi," to the objective of protecting DBS so as not to limit technical innovation and competition in technical rules generally, and antenna configurations specifically.[5]

The order continues,

> We also believe that the requirement to keep the EIRP low obviates the need to specify a minimum receive antenna gain. As such, we are placing the emphasis on allowing MVDDS operators to meet certain EPFD limits to protect existing DBS subscribers, instead of trying to define and limit their systems. Thus, we are not requiring pointing angles for MVDDS, nor are we requiring receive antenna standards as originally proposed.[6]

MDS America believes that this is exactly the proper approach, but the Commission undermines itself when addressing EIRP limits by stating,

> Th[e] [MVDDS] power limit is a compromise between our proposed limit of 12.5 dBm generally and higher power allowed under certain circumstances. The 14 dBm limit provides MVDDS with higher operating power to address their coverage concerns, but eliminates the proposed higher power exceptions to ameliorate the concerns of DBS and NGSO FSS entities that higher power would increase the size of the interference zone. Furthermore, placing a limit on MVDDS EIRP will ensure that DBS entities are not unduly hindered in their ability to acquire customers in areas in close proximity to MVDDS transmit facilities. Thus, we are not permitting higher powers over areas containing mountain ridges or over presently unpopulated regions because the higher power may cause too great of an exclusion zone for future DBS and NGSO FSS subscribers. We recognize that a higher power benefit for MVDDS providers would not offset the potential constraints placed on other service subscribers in the 12 GHz band.[7]

Here, the Commission has moved away from its initial view that it should not unduly restrict MVDDS system design. Indeed, the Commission went back on its *initial* proposal to permit a higher EIRP in urban areas, and has instead chosen to limit MVDDS operators' ability to prevent harmful interference to DBS customers. A much better approach than the Northpoint-type system described before would be to permit an urban MVDDS system to use rural transmitters,

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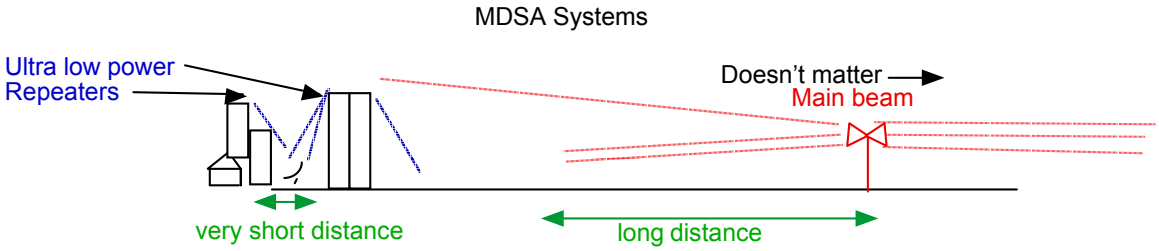
5 MVDDS Order at ¶ 202 (footnotes omitted); see also 47 C.F.R. § .101.113.

6 *Id.* at ¶ 203 (footnotes omitted).

7 *Id.* at ¶ 198 (footnotes omitted).

with the higher rural EIRP, to feed ultra-low power (.00000001 W) repeaters that provide signal to a very small area (200 meter diameter) while transmitting with enough power to cover large geographical areas.



At this juncture, DBS providers might be tempted to twist this entire argument into support for mandatory exclusion zones, or even lower EIRP limits. However, the further down this path the Commission travels, the further away it goes from being a technology-neutral referee, and the more it goes into the business of MVDDS system design.[8] The Commission has far too much experience micro-managing technical service rules, and seeing innovative services wither on the vine, to be swayed in that direction. Instead, the Commission should recognize that raising the EIRP limit for rural areas will allow MVDDS operators to design their systems to *avoid* harmful interference to DBS while simultaneously ensuring that rural Americans have choice in video programming services and the ability to receive high-speed Internet access and other advanced broadband services. So long as there is an interference limit to protect existing DBS operators, their existing service will be preserved. As for new service, using existing mitigation techniques in response to marketplace competition from more robust services will ensure not only that new service can be deployed, but also that such service will be of better

[8] *See* MVDDS Order at ¶ 202 ("we find that it is better to allow the MVDDS provider to design its own system, than to promulgate rules limiting design options.").

quality, and will suffer fewer outages. Consistent with the Commission's stated regulatory policies, the Commission should concern itself with protecting the reception of existing service, and allow the *marketplace* to give consumers new services that best satisfy their needs.

IV. Additional, Limited Modifications to the Commission's MVDDS Rules Will Enhance MVDDS Operators' Ability to Deploy Their Systems.

A. The Commission Should Reconsider its MVDDS EPFD Limits.

In the *MVDDS Order*, the Commission adopted four region-specific equivalent power flux density ("EPFD") limits in order to "accommodate co-primary Direct Broadcast Satellite Service earth stations."[9] In setting this standard, the Commission believed that it was "not unduly constraining the deployment of MVDDS."[10]

Unfortunately, based on its real-world experience with MVDDS/DBS sharing, MDS America believes that the criteria adopted by the Commission are not necessary to protect DBS but will effectively preclude deployment of MVDDS service in rural areas, the areas in which, as described above, it is most needed.[11] If MVDDS is to be deployed in rural areas with the same effectiveness as in urban areas, the technical parameters for rural operations must reflect a basic distinction between the two: population density. In rural areas, services are often scarce, regardless of the facilities or the medium, because the cost of facilities in rural areas often cannot be spread amongst a group large enough to cover the costs, let alone support a viable business. Just as the Commission would not limit antenna towers to two feet, because no customers could be served under such parameters, the Commission should refrain from restricting MVDDS

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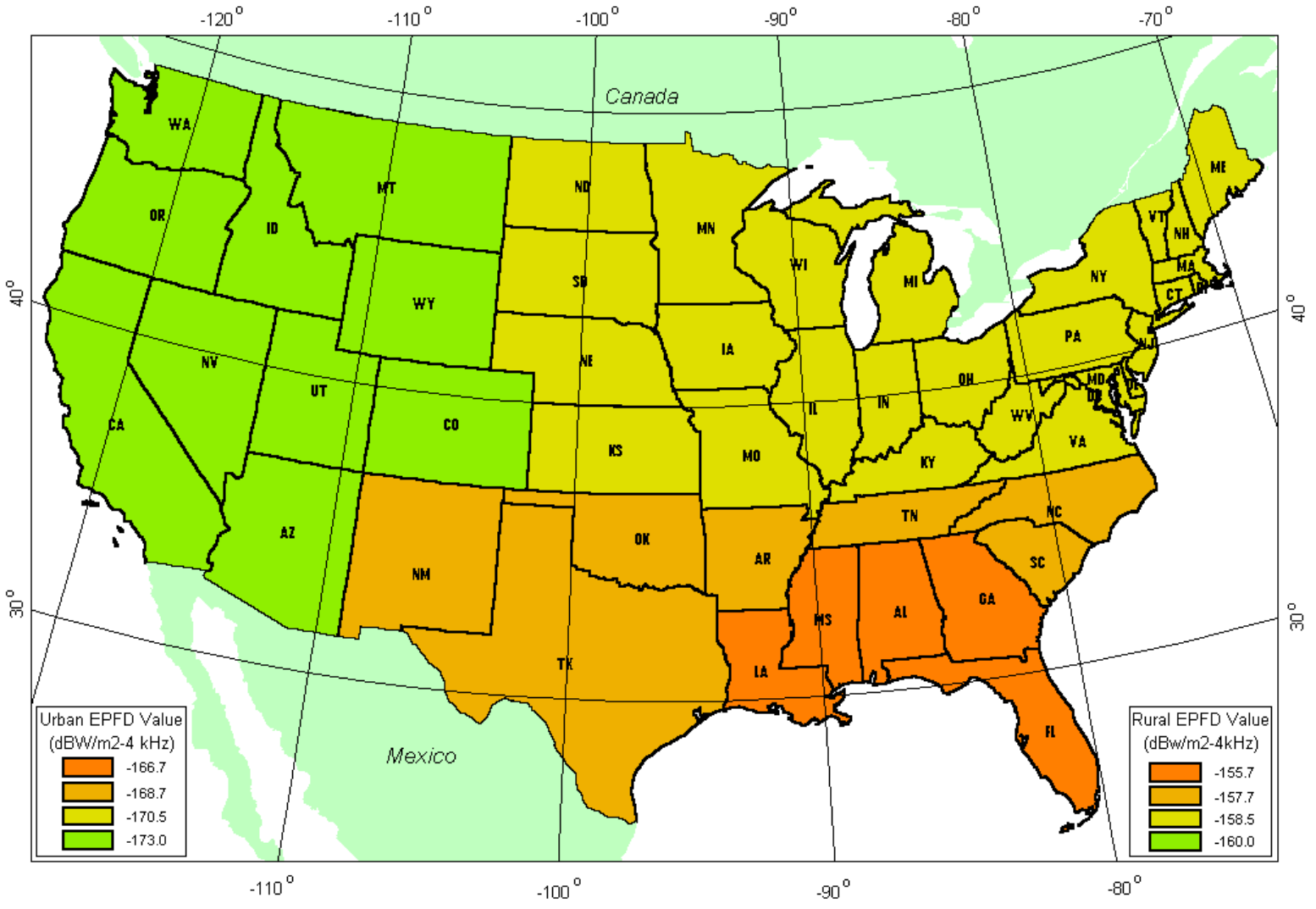
[9] 47 C.F.R. § 101.105(a)(ii).

[10] MVDDS Order at ¶ 72.

[11] As described above, in rural areas, the absence of severe multipath problems allow an MVDDS systems designer far more flexibility to design a system with higher power that will nonetheless prevent interference to DBS.



Because they are unnecessary to protect DBS operations, the EPFD limits should be revised as recommended to a level that will accommodate MVDDS deployment.

B. The Commission Should Clarify the Bandwidth Restriction in its MVDDS Emission Mask Rule.

MDS America is concerned that the Commission's emission mask rule, set forth in Section 101.111 of the Commission's Rules, unduly restricts MVDDS providers for no discernable purpose. The rule specifies that "MVDDS operations in the 12.2-12.7 GHz band

[12] *See Ex parte Letter of MDS America*, filed Feb. 12, 2002.

shall use 24 megahertz for the value of B in the emission mask equation set forth in this section." MDS America is not certain how the Commission arrived at the value of 24 megahertz for this figure. MDS America is concerned that although the Commission specified in Section 101.1405 of its Rules that the 500 MHz of MVDDS spectrum "can be divided into any size channels" by the MVDDS licensee for system design purposes, that the restriction to 24 megahertz for emission mask purposes in Section 101.111 has the practical effect of mandating some type of channelization for MVDDS after all. MDS America therefore requests clarification of the emission mask rule, because the Commission's intention may not have been to establish any such channelization restriction, as a by-product of the emission mask limits. In the MVDDS Order, the Commission seems to make very clear that it wishes to avoid any restrictions on channel size (*see* MVDDS Order at ¶¶ 134-135).

C. The Commission Should Revise its MVDDS / DBS Frequency Coordination Requirements.

MDS America recommends that the Commission revise its DBS/MVDDS frequency coordination requirements.[13] In particular, the Commission should not require MVDDS operators to survey the area around proposed transmitter sites to identify all locations where DBS receivers are deployed, and DBS operators should not be required to inform MVDDS providers of the specific sites at which they will deploy receivers within 30 days following receipt of notice from the MVDDS provider of proposed transmitter construction.

Not only is the cost of such a survey prohibitive, but also such DBS customer information would almost certainly be viewed by DBS operators as commercially sensitive. Further, DBS

[13] 47 C.F.R. § 101.1440.

operators are not likely to appreciate direct, FCC-authorized contact between the MVDDS operator and the DBS customers with respect to accepting anticipated interference.[14]

Instead, the Commission should require DBS providers to inform MVDDS operators within 45 days of receipt of the notice required by Section 101.1440(d) of any locations with DBS customers of record[15] as to which they believe the proposed MVDDS transmitter would present instances of harmful interference under the Commission's Rules. The parties could then cooperate to confirm whether such harmful interference would in fact be likely to occur and appropriate means of mitigating such interference. As the Commission is aware, spectrum coordinators are often able to avoid such potential interference when they analyze a specific situation. Moreover, the Commission has expressly provided that the DBS operator (as well as an individual DBS customer) may agree with the MVDDS operator not to oppose any specific MVDDS transmitter installation regardless of whether such installation conforms to the Commission's Rules.[16]

In sum, the Commission should reconsider and simplify the coordination requirements as they are unduly burdensome to both MVDDS and DBS operators and require the unnecessary communication of commercially sensitive information between potential competitors.

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[14] *See* 47 C.F.R. § 101.1440(a).

[15] *See* 47 C.F.R. § 101.1440(a) (defining "customers of record" as "those who had their DBS receive antennas installed prior to or within the 30 day period after notification to the DBS operator by the MVDDS licensee of the proposed transmitting antenna site").

[16] MVDS Order at ¶ 90.

D. The Commission Should Repeal or Relax the Overly Stringent MVDDS PFD Limit Intended to Protect Possible Future Non-Geostationary Fixed Satellite Service ("NGSO") NGSO Systems.

In its *MVDDS Order*, the Commission authorized the MVDDS service to operate on a basis *purely* co-primary with Non-Geostationary Fixed Satellite Service ("NGSO").[17] In so doing, the Commission adopted certain technical rules intended to protect *future*, not pre-existing, NGSO receivers from interference from MVDDS transmitters.[18] In particular, the Commission has limited the maximum MVDDS PFD to –135dBW/m^2/4kHz *measured or calculated*[19] at the surface of the earth at distances greater than 3 km from the MVDDS transmitter.[20] This is intended to provide an NGSO receiver saturation buffer zone and worst-case cap on MVDDS interference to NGSO receivers, thereby "limiting the potential for NGSO FSS receiver saturation or reliance on frequency diversity to relatively small and predictable areas . . . ."[21]

MDS America respectfully urges the Commission to reconsider the necessity of imposing such stringent limitations on MVDDS service at this time. Under the Commission's rule, even if a proposed MVDDS transmitter could be deployed in conformance with DBS-protection criteria intended to protect *existing* service from interference, the proposed operation could violate this NGSO protection criterion, a criterion intended to protect *possible* service. The preclusive impact on the MVDDS service area could, however, be considerable, regardless of whether any NGSO licensee ever contemplated putting a receiver anywhere near the proposed MVDDS transmitter

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[17] "MVDDS is authorized . . . on a purely co-primary basis to NGSO FSS." MVDDS Orde*r* at ¶ 26 (also stating MVDDS authorized on a co-primary, non-interference basis *vis-à-vis* DBS); MVDDS Order at ¶ 29; *see also* MVDDS Order at ¶ 3.

[18] *Id.* at ¶ 26 ("the MVDDS PFD will be limited").

[19] This would appear to eliminate even an opportunity to demonstrate that a predicted PFD limit is in fact not exceeded at the subject location.

[20] 47 C.F.R. ¶ 101.105; *see also* MVDDS Order at ¶ 112.

location, much less actually deployed it. Moreover, the problem could be particularly acute in rural areas, where large service areas may be critical even to establishment of any MVDDS service, and where it might otherwise be possible to locate an antenna 1000 AMSL without adversely affecting reception of DBS service. Thus, this rule, intended to protect not existing but possible future service, could have the effect of absolutely barring MVDDS service to rural communities that could otherwise receive it perhaps as soon as mid-2003. If the Commission nonetheless concludes that it is necessary to have such a limit, then for rural areas the limit should be modified to -109 dBW/m2/4kHz at distances greater than 3 km at the surface of the earth.

While a number of NGSO systems have recently been licensed, given the current state of capital markets, and of new satellite systems, it is uncertain whether any such satellites will be launched soon, much less that there will be NGSO service available to end-users in anything approaching the near-term. In all likelihood, NGSO service will require reception equipment costing a minimum of $250,000 per installation, making it a large business customer service, and not one with ubiquitous deployment. Also, as recent experience has demonstrated, given the lag time between licensing and commencement of satellite service, and the substantial likelihood of deployment of competing, less expensive technologies in the meantime, there is no certainty that the recently-licensed NGSO systems will ever commence service.[22] What is certain is that there

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[21] *Id.*

[22] *See* Pisciotta, Sifers, Wilson, and Paroutsas, "Regulatory Considerations Affecting Investments In Global Satellite And Undersea Cable Systems," included in, Practicing Law Institute, *Telecom Deals Now: Understanding the Interplay of Regulatory, Corporate, Securities & Bankruptcy Issues* (2001) at 443–44 ("There is a relatively short time-to-market period before alternative solutions. At conception, MSS ventures such as Iridium and ICO anticipated serving markets where wireline and wireless alternatives did not exist, or where service was unreliable at pricing levels well in excess of what conventional service would cost, if available. By the time Iridium was built out, many other alternatives were available at significantly lower pricing levels. Although satellite systems have the technical ability to serve unserved and underserved areas, the success of these systems depends on generating sufficient demand. Service must be priced at rates that will generate use. Consumers in the primary service areas must have sufficient income to pay for the service. Changing technology causes rapid obsolescence. Even after the

will *not* be an NGSO receiver within the required buffer zone of *each* MVDDS transmitter. Nonetheless, the rule would impose an immediate constraint on *all* MVDDS transmitters. This is, to say the least, overkill, and it will effectively bar much potential MVDDS service to unserved and underserved communities, particularly in rural areas.

Given that no NGSO systems have been deployed, and reception equipment is not yet on the market, the record is insufficient to demonstrate that the rule is at all necessary. Without the ability to consider the operational characteristics of a given NGSO receiver,[23] the Commission has an insufficient record on which to base the rule. This is particularly true because frequency diversity is already available to address the limited number of situations in which MVDDS transmission could actually interfere with NGSO reception. Also, engineering developments are likely to occur that could substantially change the coordination and co-existence environment long before NGSO service is a reality. While the Commission's efforts to devise a relatively straight-forward criterion are appreciated, and the Commission's rule is superior to approaches proposed by NGSO operators, under these circumstances, consideration of the substantial preclusive impact of the PDF limit rule warrants its reconsideration.

Given the severe technical constraints otherwise imposed on MVDDS service by the technical rules intended to protect existing DBS operations, the service areas and potential site locations of MVDDS transmitters are already substantially circumscribed. This NGSO-

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space segment has been deployed, an immediate problem for satellite systems may not be lack of subscribers or market uptake, but distribution issues. Sufficient manufacturing capability must exist to meet demand. The distribution chain must be designed to get user terminals to end-users in advance of the start of commercial service. Failure to make user terminals available in advance of start of commercial operation could potentially decrease demand for satellite-based services as customers seek and obtain alternate solutions.") (footnotes omitted).

[23] MDS America notes, however, that the very preliminary data concerning possible characteristics of receivers that NGSO operators might deploy demonstrates that the receiver characteristics vary significantly, and that the potential for interference from MVDDS operations also varies significantly. For example, Skybridge proposed initial deployment of a preliminary receiver design with substantial limitations on frequency diversity capacity even compared with Skybridge's own proposed second-generation receiver. *See* MVDDS Order at ¶ 107 - 08.

protection rule further limits MVDDS operations. The Commission has already made the policy determination that MVDDS can provide important broadband services to unserved and underserved populations. If the promise of this new service is to become a reality, however, the service cannot be foreclosed before it is even deployed. Here, there is no record evidence of the operating parameters of actual NGSO receivers, and no certainty as to which, or even whether any, receivers may be deployed. It is therefore premature to adopt on the basis of speculation restrictive MVDDS service rules either that may never be needed or that may not be effective for their intended purpose, but which by their mere existence chill and even foreclose MVDDS operations. Just as the Commission properly rejected polarization limits on MVDDS, so too should it reject the NGSO-protective PFD limits because they "would only serve to undermine operational flexibility of MVDDS licensees and hinder efficient sharing of the 12 GHz band in exchange for a marginal benefit to NGSO FSS."[24]

As the Commission is well aware, it is a usual practice in the wireless community for operators authorized in the same and co-primary services to seek to resolve instances of predicted potential interference on the basis of bilateral negotiations, regardless of which operator has temporal priority. Wireless operators have at their command a number of mitigation methods and techniques that have long worked to avoid actual interference even in circumstances where harmful interference is predicted.[25] This real-world, pragmatic approach promotes the public interest in efficient spectrum usage and maximum service to the public. MDS America, as an equipment supplier, is committed to working with its MVDDS licensee

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[24] *See* MVDDS Order at ¶ 115.

[25] In this connection, it should be noted that MDS America is *not* advocating that an MVDDS operator perform mitigation on an in-place NGSO FSS receiver, *see* MVDDS Order at ¶ 29, but merely that there is more than ample time prior to NGSO deployment for development of receiver design-specific and generic mitigation techniques that can be employed at the time an NGSO receiver is to be installed in an area near an existing MVDDS transmitter.

customers and the NGSO operators to develop appropriate interference mitigation strategies.

Given that there has been no actual experience with NGSO operations, and no certainty as to when, if ever, or which reception equipment may be deployed, MDS America urges the Commission to repeal Section 101.105 as prematurely adopted. The Commission can re-examine the issue when there is a sufficient record on which to base an analysis of requirements for optimal MVDDS/NGSO sharing. If it must adopt a rule at this time, then for rural areas, the limit should be -109 dBW/m2/4kHz at distance greater than 3 km at the surface of the earth.

V. Conclusion

For the foregoing reasons, MDS America respectfully requests that the Commission partially reconsider the technical rules adopted for the MVDDS service. In particular, MDS America urges the Commission to adopt a two-tiered MVDDS EIRP limitation, with higher power permitted transmitters located in rural areas. MDS America proposes that the Commission retain its EIRP limit of 14 dBm for urban areas, but increase the rural EIRP limit to 39 dBm. This increase in the EIRP limit for rural areas will permit MVDDS to be deployed where this new service is needed most—in less populated areas. As described in this Petition, MDS America also recommends, based on its real-world experience with MVDDS technology in active systems around the world, that the Commission further modify and clarify its rules to ensure the maximum flexibility in MVDDS system deployment.

Respectfully submitted,

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June 24, 2002